

CLAIMS

What is claimed is:

1. A gasket admixture, comprising:
 - (a) fluoroelastomer particulate derived from vinylidene-fluoride, hexafluoropropene, and tetrafluoroethylene, said fluoroelastomer having a Mooney viscosity from about 25 to about 75, fluorine from about 65 to about 69 atomic weight percent, at least 90 weight percent fluoroterpolymer, and halogenated crosslink sites;
 - (b) inert particulate from about 10 to about 50 parts per 100 parts by weight of said fluoroelastomer particulate, said inert particulate having particle sizes less than about 250 mesh;
 - (c) curing agent from about 0.5 to about 20 parts per 100 parts by weight of said fluoroelastomer particulate, wherein said curing agent crosslinks said fluoroelastomer particulate to generate cured fluoroelastomer and hydrogen ions; and
 - (d) magnesium oxide reduction-agent particulate from about 5 to about 50 parts per 100 parts by weight of said fluoroelastomer particulate, said metallic oxide reduction-agent particulate having particle sizes less than about 250 mesh, said magnesium oxide having a BET surface area from about 40 to about 70 square meters per gram.

2. A gasket admixture according to Claim 1, further comprising polytetrafluorinated ethylene particulate of less than about 75 parts per 100 parts by weight of said fluoroelastomer particulate, said polytetrafluorinated ethylene particulate having a mean particle size from about 10 to about 50 microns.

3. A gasket admixture according to Claim 1, further comprising microspheres, at a level of from about 0.5 to about 20 parts per 100 parts by weight of said fluoroelastomer particulate.

4. A gasket admixture according to Claim 1, further comprising a wax particulate in from about .05 parts to about 5 parts per 100 parts by weight of said fluoroelastomer particulate.

5. A gasket admixture according to Claim 1, further comprising solvent sufficient to provide an admixture viscosity from about 10,000 centipoises to about 500,000 centipoises.

6. A gasket admixture according to Claim 5, wherein said solvent comprises a ketone, alcohol, or ester solvent or a mixture thereof.

7. A gasket admixture according to Claim 5, wherein said solvent is selected from the group consisting of methyl isobutyl ketone, ethyl acetate, cellosolve acetate, sorbitol acetate, 3,5,5-trimethyl-3-cyclohexenene-1-one, cyclohexene-1-one, butyl cellulose acetate, ethanol, methanol, isopropanol, or a mixture thereof.

8. A gasket admixture according to Claim 5, wherein said solvent comprises a blend of about 20 weight percent 3,5,5-trimethyl-3-cyclohexenene-1-one, about 20 weight percent cyclohexene-1-one, and about 60 weight percent butyl cellulose acetate.

9. A gasket admixture according to Claim 1, wherein said curing agent comprises an amine.

10. A gasket admixture according to Claim 9, wherein said amine curing agent is selected from the group consisting of n,n'-dicinnamylidene-1,6-hexene, hexamethylene diamine carbamate, ethylene diamine carbamate, and combinations thereof.

11. A gasket admixture according to Claim 1, wherein said metallic oxide reduction-agent particulate comprises MgO from about 1 to about 30 parts per 100 parts by weight of said fluoroelastomer particulate.

12. A gasket admixture according to Claim 1, wherein said inert particulate is selected from the group consisting of calcium carbonate, carbon black, graphite, fumed silica, and kaolin and mixtures thereof.

13. A coating admixture according to Claim 12 wherein said inert particulate is carbon black, said curing agent is n,n'-dicinnamylidene-1,6-hexene, and said admixing further comprises admixing:

- (e) polytetrafluorinated ethylene particulate of less than about 75 parts per 100 parts by weight of said fluoroelastomer particulate, said polytetrafluorinated ethylene particulate having a mean particle size from about 10 to about 50 microns;
- (f) wax particulate of from about .05 parts to about 5 parts per 100 parts by weight of said fluoroelastomer particulate; and
- (g) solvent sufficient to provide an admixture viscosity from about 10,000 centipoises to about 500,000 centipoises, wherein said solvent comprises a blend of about 20 weight percent 3,5,5-trimethyl-3-cyclohexenene-1-one, about 20 weight percent cyclohexene-1-one, and about 60 weight percent butyl cellulose acetate.

14. A gasket admixture according to Claim 13 wherein said carbon black is about 35 parts per 100 parts by weight of said fluoroelastomer particulate, said polytetrafluorinated ethylene particulate is about 5 parts per 100 parts by weight of said fluoroelastomer particulate, said n,n'-dicinnamylidene-1,6-hexene is about 8 parts per 100 parts by weight of said fluoroelastomer particulate, and said MgO is about 20 parts per 100 parts by weight of said fluoroelastomer particulate.

15. A gasket admixture according to Claim 13, further comprising microspheres, said microspheres about 8 parts per 100 parts by weight of said fluoroelastomer particulate.

16. A method for making a gasket admixture, comprising admixing:
 - (a) fluoroelastomer particulate derived from vinylidene-fluoride, hexafluoropropene, and tetrafluoroethylene, said fluoroelastomer having a Mooney viscosity from about 25 to about 75, fluorine from about 65 to about 69 atomic weight percent, at least 90 weight percent fluoroterpolymer, and halogenated crosslink sites;
 - (b) inert particulate from about 10 to about 50 parts per 100 parts by weight of said fluoroelastomer particulate, said inert particulate having particle sizes less than about 250 mesh;
 - (c) curing agent from about 0.5 to about 20 parts per 100 parts by weight of said fluoroelastomer particulate, wherein said curing agent crosslinks said fluoroelastomer particulate to generate cured fluoroelastomer and hydrogen ions;
and
 - (d) magnesium oxide reduction-agent particulate from about 5 to about 50 parts per 100 parts by weight of said fluoroelastomer particulate, said metallic oxide reduction-agent particulate having particle sizes less than about 250 mesh, said magnesium oxide having a BET surface area from about 40 to about 70 square meters per gram.

17. A fuel cell, comprising:
 - (a) a bipolar plate;
 - (b) a membrane electrode assembly; and
 - (c) a gasket interposed between said plate and said assembly, said gasket cured from an admixture of:
 - (1) fluoroelastomer particulate derived from vinylidene-fluoride, hexafluoropropene, and tetrafluoroethylene, said fluoroelastomer having a Mooney viscosity from about 25 to about 75, fluorine from about 65 to about 69 atomic weight percent, at least 90 weight percent fluoroterpolymer, and halogenated crosslink sites;
 - (2) inert particulate from about 10 to about 50 parts per 100 parts by weight of said fluoroelastomer particulate, said inert particulate having particle sizes less than about 250 mesh;
 - (3) curing agent from about 0.5 to about 20 parts per 100 parts by weight of said fluoroelastomer particulate, wherein said curing agent crosslinks said fluoroelastomer particulate to generate cured fluoroelastomer and hydrogen ions; and
 - (4) magnesium oxide reduction-agent particulate from about 5 to about 50 parts per 100 parts by weight of said fluoroelastomer particulate, said metallic oxide reduction-agent particulate having particle sizes less than about 250 mesh, said magnesium oxide having a BET surface area from about 40 to about 70 square meters per gram.

18. A fuel cell according to Claim 17 wherein said admixture further comprises polytetrafluorinated ethylene particulate of less than about 75 parts per 100 parts by weight of said fluoroelastomer particulate, said polytetrafluorinated ethylene particulate having a mean particle size from about 10 to about 50 microns.

19. A fuel cell according to Claim 17 wherein said admixture further comprises microspheres, said microspheres from about 0.5 to about 20 parts per 100 parts by weight of said fluoroelastomer particulate.

20. A fuel cell according to Claim 17 wherein said admixture further comprises a wax particulate, said wax particulate from about .05 parts to about 5 parts per 100 parts by weight of said fluoroelastomer particulate.

21. A fuel cell according to Claim 17 wherein said inert particulate is selected from the group consisting of calcium carbonate, carbon black, graphite, fumed silica, and kaolin and mixtures thereof.

22. A fuel cell according to Claim 17 wherein said curing agent comprises an amine.

23. A fuel cell according to Claim 22 wherein said amine curing agent is selected from the group consisting of n,n'-dicinnamylidene-1,6-hexene, hexamethylene diamine carbamate, ethylene diamine carbamate, and combinations thereof.

24. A fuel cell according to Claim 17 wherein said metallic oxide reduction-agent particulate comprises MgO from about 1 to about 30 parts per 100 parts by weight of said fluoroelastomer particulate.

25. A fuel cell according to Claim 17 wherein said admixture further comprises solvent sufficient to provide an admixture viscosity from about 10,000 centipoises to about 500,000 centipoises.

26. A fuel cell according to Claim 25 wherein said solvent comprises a ketone, alcohol, or ester solvent or a mixture thereof.

27. A fuel cell according to Claim 26 wherein said solvent is selected from the group consisting of methyl isobutyl ketone, ethyl acetate, cellosolve acetate, sorbitol acetate, 3,5,5-trimethyl-3-cyclohexenene-1-one, cyclohexene-1-one, butyl cellulose acetate, ethanol, methanol, isopropanol, or a mixture thereof.

28. A fuel cell according to Claim 27 wherein said solvent comprises a blend of about 20 weight percent 3,5,5-trimethyl-3-cyclohexenene-1-one, about 20 weight percent cyclohexene-1-one, and about 60 weight percent butyl cellulose acetate.

29. A gasket admixture, comprising:
- (a) fluoroelastomer particulate derived from vinylidene-fluoride, hexafluoropropene, and tetrafluoroethylene, said fluoroelastomer having a Mooney viscosity from about 25 to about 75, fluorine from about 65 to about 69 atomic weight percent, at least 90 weight percent fluoroterpolymer, and halogenated crosslink sites;
 - (b) curing agent from about 0.5 to about 20 parts per 100 parts by weight of said fluoroelastomer particulate, wherein said curing agent crosslinks said fluoroelastomer particulate to generate cured fluoroelastomer and hydrogen ions; and
 - (c) magnesium oxide reduction-agent particulate from about 5 to about 50 parts per 100 parts by weight of said fluoroelastomer particulate, said metallic oxide reduction-agent particulate having particle sizes less than about 250 mesh, said magnesium oxide having a BET surface area from about 40 to about 70 square meters per gram.